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Environmental Pollutants Affect the Unborn — But They Can Also Affect the Long-Term Health of Pregnant Women

Researchers are discovering associations between exposure to pollutants during pregnancy and health conditions that can last long after giving birth, such as hypertension and diabetes.

By **Environmental Health News**



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By **Lily Stewart**

The effects of environmental hazards on [children's health](#) are widely researched and documented.

Exposure to [environmental pollutants](#) can be especially damaging to fetuses as they develop in the womb, resulting in low birth weights, congenital disorders and even stillbirths.

But during pregnancy, fetuses' bodies aren't the only ones that develop. Pregnant people go through a development period, too, making them more vulnerable to the health effects of [environmental stressors](#) like air pollution, heavy metals, [PFAS](#) (per- and polyfluoroalkyl substances), endocrine-disrupting chemicals, pesticides and others.

Now, scientists are starting to study how being exposed to environmental stressors affects pregnant people's short- and long-term health.

Though the mechanisms aren't clear yet, a handful of researchers across the world are discovering associations between exposure to pollutants during pregnancy and health conditions that can last long after giving birth, such as hypertension and diabetes.

They contend that this burgeoning body of scientific literature shows the need for further research to protect and promote the health of the almost 130 million people worldwide who give birth each year.



Vulnerability during pregnancy

During pregnancy, the body undergoes [dramatic changes](#): blood volume increases, brain volume decreases, hormones fluctuate, the placenta grows and breasts develop as cells differentiate to start producing milk.

The stress that these changes place on the body is significant, so much so that authors of a 2020 review on how [chemical exposures impact maternal health](#) describe pregnancy as a “borderline disease state” when the body is more susceptible to the harms of stressors like environmental pollutants and damage can hit harder and last longer than it would otherwise.

Researchers like Tracy Bastain are trying to figure out exactly what these repercussions are and how they might occur.

Bastain is an environmental epidemiologist and co-director of the Maternal and Developmental Risks from Environmental and Social Stressors (MADRES) Center at the University of Southern California. The MADRES Center is one of a small number of research centers in this field.

Bastain's research focuses on a cohort of 1,100 mothers and their children, primarily from Hispanic and low-income backgrounds. It is one of the largest pregnancy cohorts dedicated to the study of environmental and social impacts on maternal and child health.

Since 2015, MADRES researchers have regularly collected blood, hair and urine samples from study participants to identify when and how much they were exposed to substances like harmful chemicals and metals. They also gathered [air pollution](#) data based on participants' residential addresses.

These data help researchers investigate connections between stressors and maternal health outcomes. They are in the middle of studies that investigate stressors' effects on cardiovascular health post-pregnancy and rates of postpartum depression, both of which can impact long-term heart, metabolic and mental health.

“The beauty of a study like this is that we've collected so much data over time across all these areas, so we can look at all these connections,” Bastain told Environmental Health News (EHN).

She hopes to maintain the cohort for many decades so that researchers can study health effects beyond a couple years post-pregnancy.

“This is not an easy endeavor,” she said. “But it's very rewarding.”

Suzanne Fenton, a reproductive toxicologist and Director of NC State's Center for Human Health and the Environment, agreed that studying this subject is challenging.

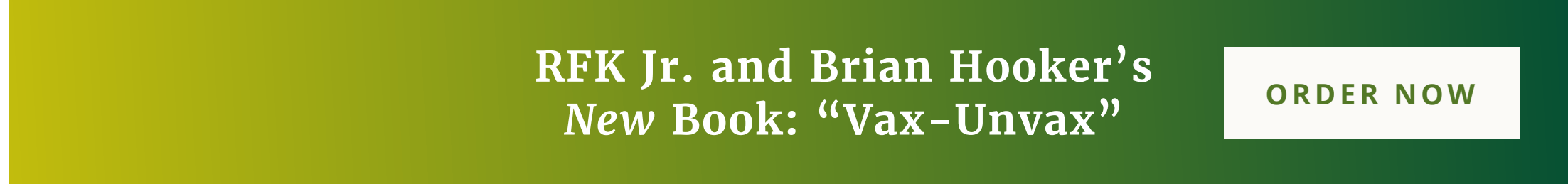
“Causal effects of the environment in women are really hard to come by,” she told EHN.

Researchers can't expose a person to pollutants and wait to see what happens, so they use mice and other lab animals to test what kinds of exposures cause specific results. Even if an effect is clear in an animal model, researchers still have to find a way to study it in humans.

Despite these obstacles, researchers have identified some strong associations between exposures and health outcomes.

A [2021 paper](#) co-authored by Fenton reviewed links between exposure to common pollutants, like particulate matter and heavy metals, and increased risks of developing [preeclampsia](#) and [gestational diabetes](#) during pregnancy, as well as hypertension and [breast cancer](#) later in life.

Even pregnancy-specific conditions can lead to life-long cardiovascular and metabolic complications: People with preeclampsia are four times more likely to experience [heart failure later in life](#) than people without preeclampsia, and people with [gestational diabetes](#) are 10 times more likely to develop [Type 2 diabetes](#) than people without gestational diabetes.



Reexamining views of pregnant people

But little is known about how these exposures might directly cause negative health outcomes, what kinds of exposures are the most harmful and when pregnant people are the most susceptible.

Kathleen Crowther, a historian at the University of Oklahoma who studies the history of science, said this lack of knowledge isn't surprising.

“There has been a very long history of viewing pregnant people as, at best, just incubators for babies and, at worst, as harmful to fetuses,” Crowther told EHN.

Since antiquity, pregnant people have been blamed for their infants' poor health — an ancient assumption Crowther said still lingers and encourages fetuses to be prioritized over pregnant people carrying them.

“These ideas have really continued even though we know considerably more about pregnancy and fetal development,” she added.

Jun Wu, an environmental health scientist at the University of California, Irvine, who studies environmental influences on reproductive outcomes, is familiar with this prioritization.

In October 2023, Wu published a study that found an association between high levels of air pollution and increased rates of [postpartum depression](#) — a condition that can cause deep sadness, anxiety, difficulty bonding with the baby and even suicidal ideation.

Wu explained that it is challenging to study postpartum depression because new parents don't always seek help due to stress, shame, a lack of knowledge and prioritizing their babies over themselves, so the condition, which affects [10-20% of people after giving birth](#) up to three years postpartum, often goes under-diagnosed.

Bastain is also interested in studying postpartum depression at the MADRES Center, especially because people don't always view mental health as something that can be affected by pollutants.

Uncovering the myriad ways that pregnant people's bodies are impacted by environmental stressors and creating evidence-based strategies for preventing and mitigating those effects will require researchers to study health during and after pregnancy more holistically, she said.

Until then, scientists like Wu are focused on helping researchers, healthcare providers and policymakers understand the importance of considering environmental hazards when discussing health during and after pregnancy.

“Research is one thing,” Wu told EHN. “How to use the research to really help a vulnerable population is another.”

Originally published by [Environmental Health News](#).

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